US Army Corps of Engineers

2005 Hurricane Season Region/ Division Perspectives

FEMA

- Region IV
- Region VI
- SAD
- MVD
- SWD

US Army Corps of Engineers

USACE/FEMA 2005/2006 Hurricane Season Critique and Planning Workshop
March 07– March 09 2006
Arlington, TX

FEMA

FEMA Region VI Perspective

US Army Corps of Engineers

Katrina Timeline for Louisiana

FEMA

- 08/27: Region VI RRCC activated in Denton at Level 1
- 08/27: LA EOC activated at Level 1; ERT A deployed
- 08/27: President declares FEMA-3212-EM-LA
- 08/29: Hurricane Katrina made landfall in southeastern

  Louisiana as a Category four (4) hurricane
- 08/29: President declares FEMA-1603-DR-LA
- 09/02: President declares FEMA-3215-EM-AR
- 09/05: President declares FEMA-3219-EM-OK
- 09/07: President declares FEMA-3229-EM-NM
- 09/12: JFO becomes fully operational in LA

Wind Speed and Storm Surge

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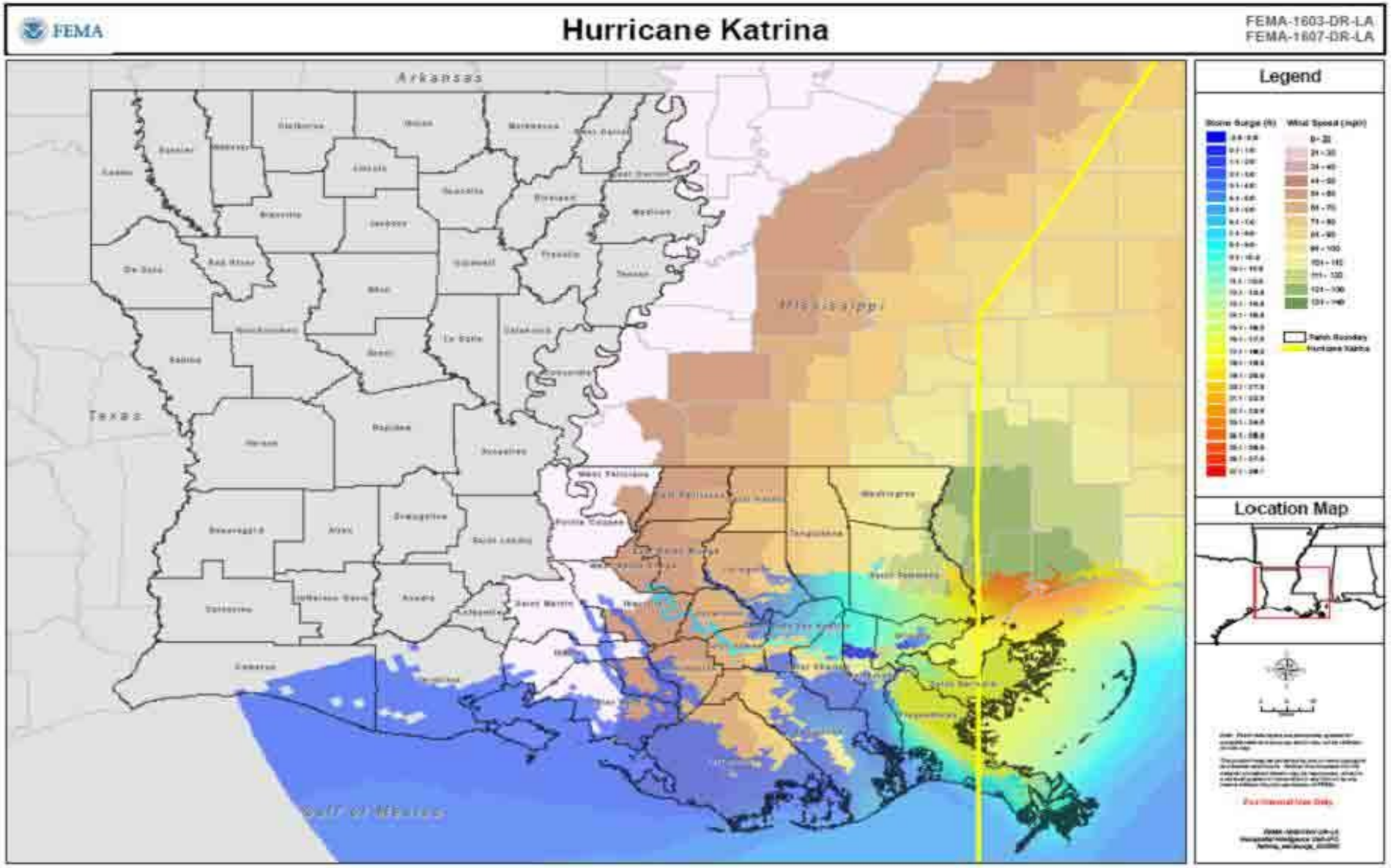
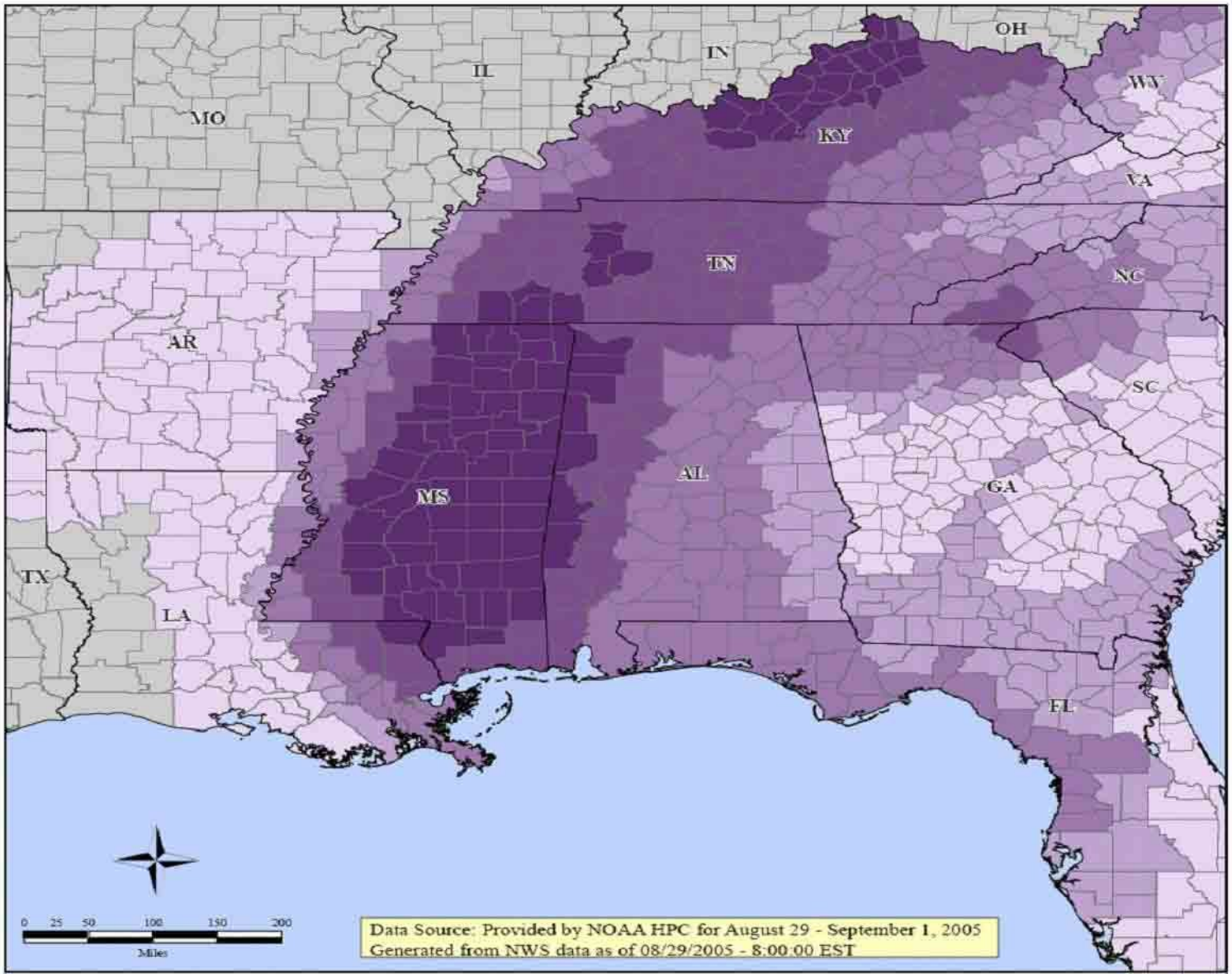
of Engineers

FEMA



urricane Katrina Predicted Rainfall Totals by Coun
August 29 – September 01, 2005



Legend

Three Day Rainfall Totals
(in Inches)

- 0.01 - 0.52
- 0.75 - 1.26
- 1.50 - 2.75
- 3.00 - 4.50
- 5.00 - 7.01

Location Map

FEMA

ITS Mapping and Analysis Center
Washington, DC
08/29/05 -- 11:57:00 EDT

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Rita Timeline for Louisiana

FEMA

- 09/21: President declares FEMA-3260-EM-LA
- 09/24: President declares FEMA-1607-DR-LA
- 09/24: At 0230 CDT Hurricane Rita makes landfall near Sabine Pass, Texas as a Category three (3)

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Louisiana Commodities for Katrina and Rita

FEMA

- Ice
  - 2,120 Truck loads delivered (89M lbs)
- Water
  - 2,310 Truck loads delivered (10.4M lbs)
- Power
  - Approx. 330 generators used

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Temporary Roofing Operation Blue Roof for Louisiana

FEMA

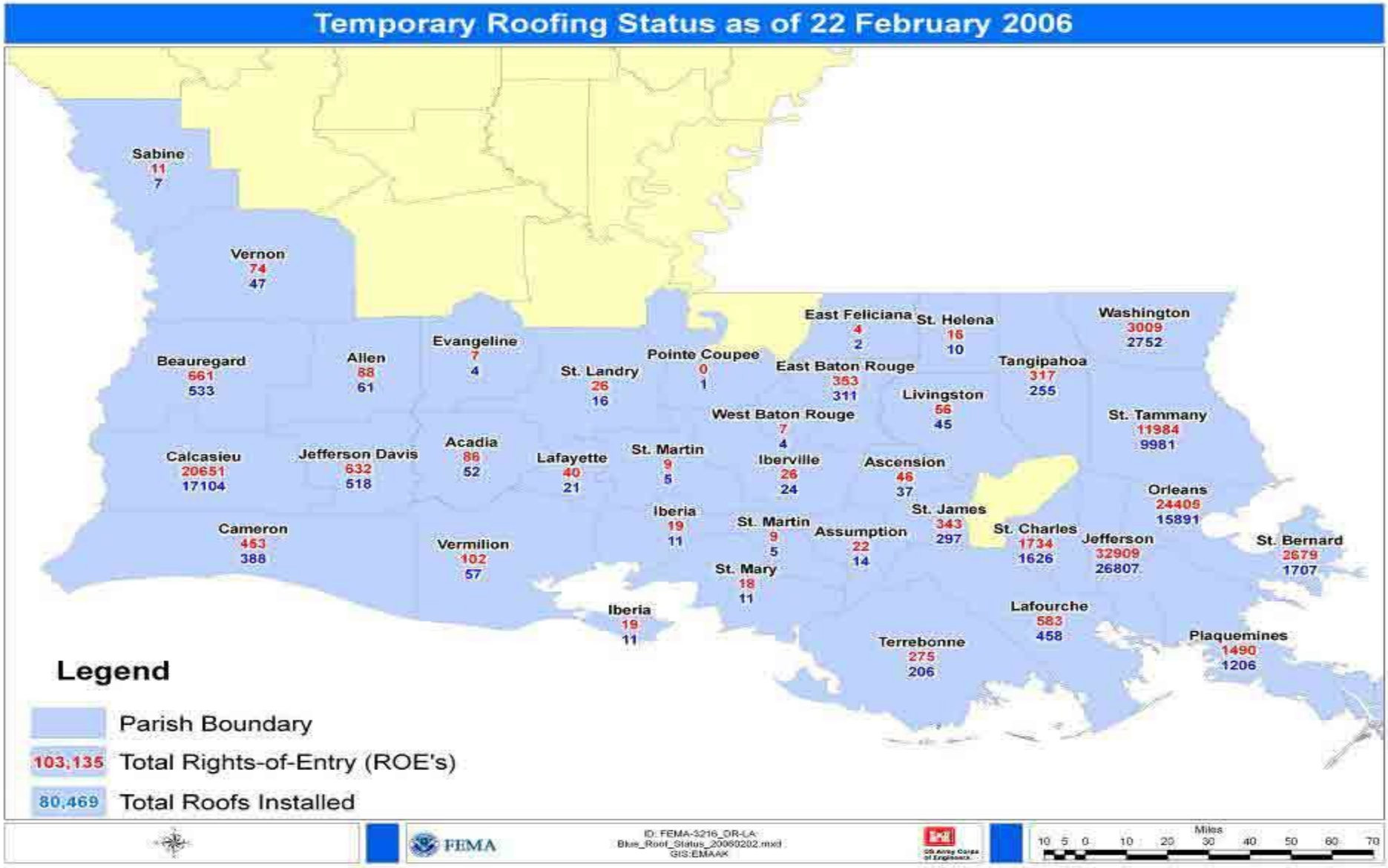
Katrina and Rita:

- 80,469 roofs installed
- 36 parishes included in Blue Roof Operation

US Army Corps of Engineers

FEMA

Temporary Roofing Status as of 22 February 2006



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Debris Removal for Louisiana

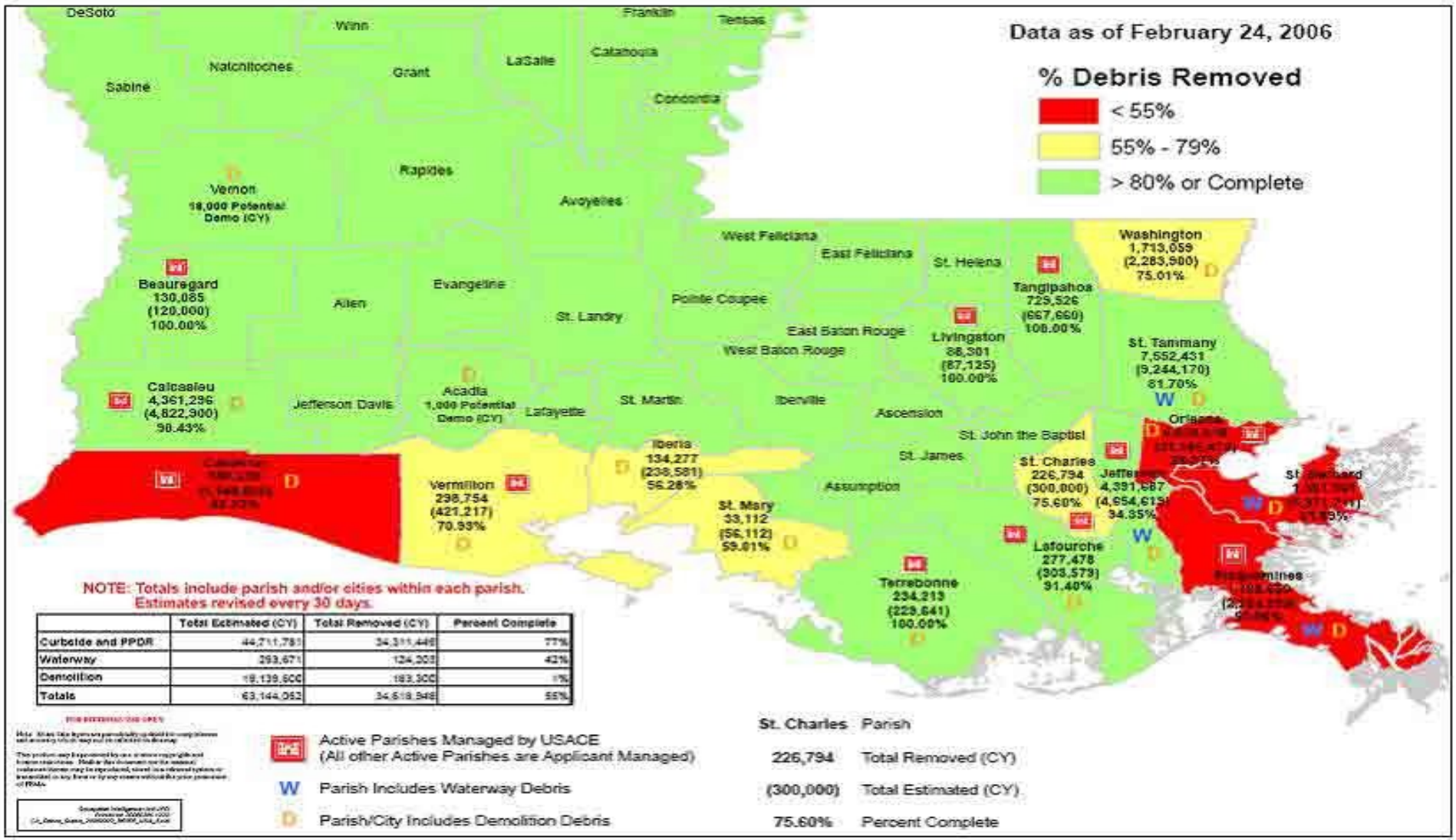
FEMA

- 63 million CY total estimated
- 35.2 million CY removed / 56% complete
- White Goods:
  - 321,000 units collected
- Hazardous Waste
  - 14 million lbs. collected

US Army Corps of Engineers

FEMA

Applicant and USACE Managed Debris FEMA-1603-1607



	Total Estimated (CY)	Total Removed (CY)	Percent Complete
Curbside and PPDR	44,711,781	34,311,446	77%
Waterway	293,671	124,303	42%
Demolition	19,139,600	183,300	1%
Totals	63,144,052	34,619,949	55%

US Army Corps of Engineers

Louisiana Temporary Housing

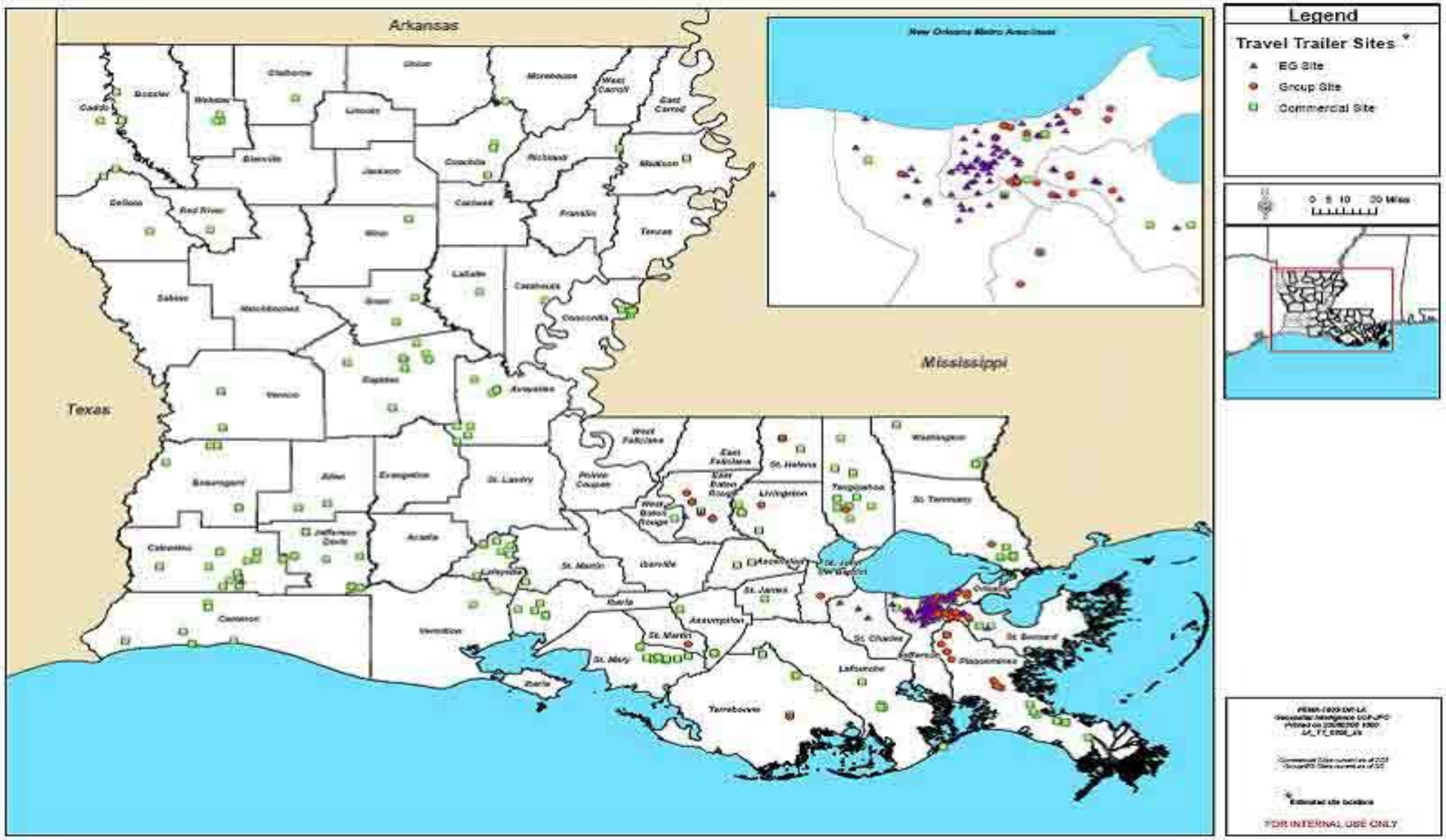
FEMA

- FEMA estimated need: 98,000 units
- 47,632 currently leased
- Mission is ongoing

US Army Corps of Engineers

FEMA

Travel Trailer Sites
Louisiana, March 6, 2006



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Katrina Timeline for Texas

FEMA

- 08/29: Hurricane Katrina made landfall in southeastern Louisiana as a Category four (4) hurricane; as a result an estimated 427,000 people evacuated to Texas
- 09/02: President declares FEMA-3216-EM-TX
- 09/12: JFO becomes fully operational in TX

US Army Corps of Engineers

Rita Timeline for Texas

FEMA

- 09/19: JFO Designated as RRCC for Hurricane Rita
- 09/20: The RRCC for Hurricane Rita begins operations in the Austin JFO
- 09/21: President declares FEMA-3261-EM-TX
- 09/24: At 0230 CDT Hurricane Rita makes landfall near Sabine Pass, Texas as a Category three (3)
- 09/24: President declares FEMA-1606-DR-TX
- 09/24: Texas JFO opened in Austin; RRCC continues operations

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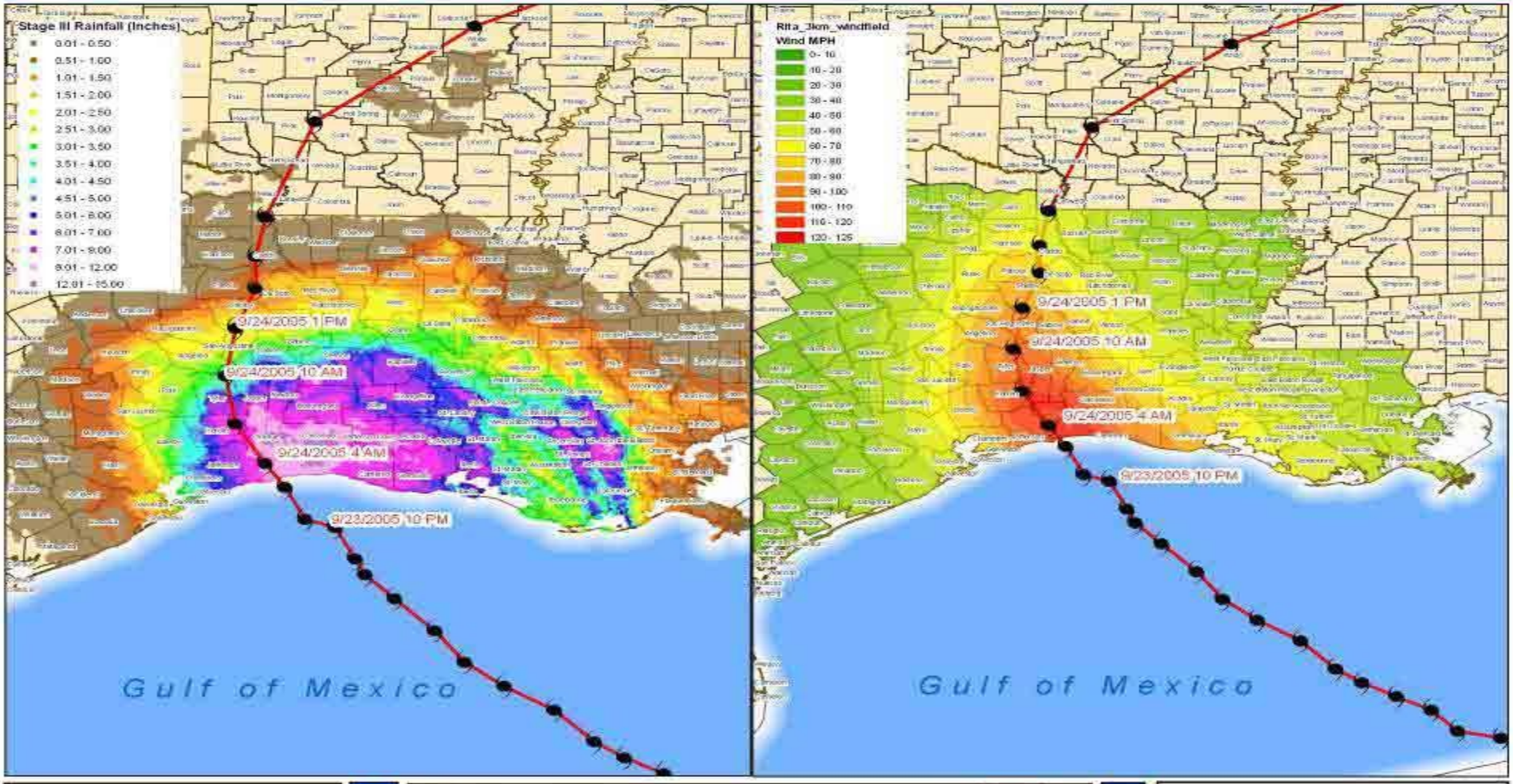
of Engineers

FEMA

Hurricane Rita - 24 Hour Stage III Rainfall and Wind Speeds



RITA Track

FEMA

ID: FEMA-1606-DR-TX
FEMA-AUSTIN RRCC/JFO; DATE: 12/22/05
Rainfall_Wind_20051222.mxd
GIS: EMAAK

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Miles
50 25 0 50 100 150 200

US Army Corps of Engineers

FEMA

Texas Commodities

- Ice
  - 744 Truck loads delivered (3M lbs/$17M)
- Water
  - 909 Truck loads delivered (4.5M gallons/ $16M)
- Power
  - 289 generators installed ($41M)

US Army Corps of Engineers

Temporary Roofing Operation Blue Roof for Texas

FEMA

- 22 Counties
- Over 20,000 installed
- $44M ($2,100/house)

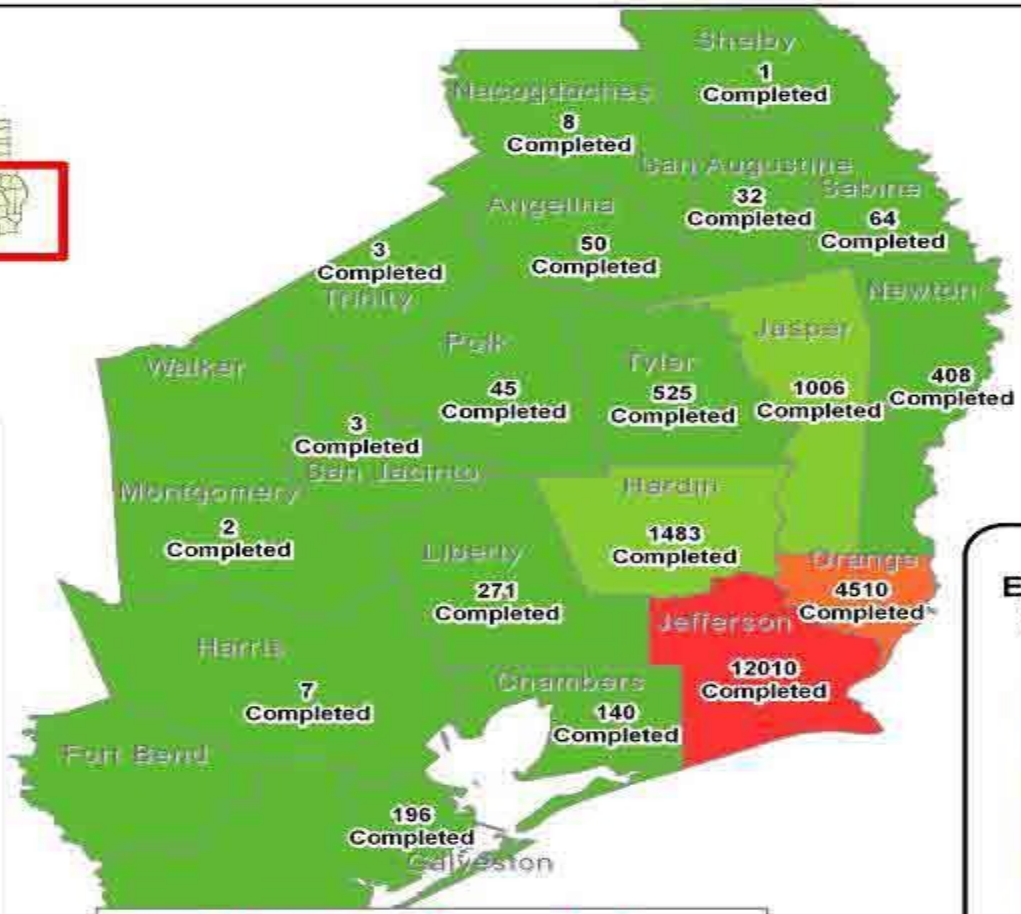
US Army Corps of Engineers

FEMA

Hurricane Rita - Roofing Mission Status

Roofs Completed: (Total) Est. 20874

- Angelina County: 50
- Brazoria County: 0
- Chambers County: 139
- Fort Bend County: 0
- Galveston County: 194
- Hardin County: 1471
- Harris County: 7
- Jasper County: 997
- Jefferson County: 11955
- Liberty County: 270
- Montgomery County: 2
- Nacogdoches County: 8
- Newton County: 402
- Orange County 4483
- Polk County: 41
- Sabine County: 64
- San Augustine County: 32
- San Jacinto County: 2
- Shelby County: 1
- Trinity County: 3
- Tyler County: 513
- Walker County: 0



Mission Complete
20,870 Roofs Completed

Estimated Damaged Roofs per County
18 December 2005

- 0 - 1000
- 1001 - 2000
- 2001 - 3000
- 3001 - 4000
- 4001 - 5000
- 5001 - 6000
- 6001 - 7000
- 7001 - 15000

FEMA

ID: FEMA-1609-DR-TX
FEMA-AUSTIN RRCC/JFO; 12/15/05 1200
Roofing_SITREP_20060303.mxd
GIS: E Maak

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20 10 0 20 40
Miles

US Army Corps of Engineers

Debris Removal for Texas

FEMA

- 8.6 million CY total estimated
- 8.5 million CY removed / 99% complete
- USACE 4.8 million CY / $150 million ($22/CY)
- 19,170 stumps removed
- 13 sunken vessels removed from waterways

US Army Corps of Engineers

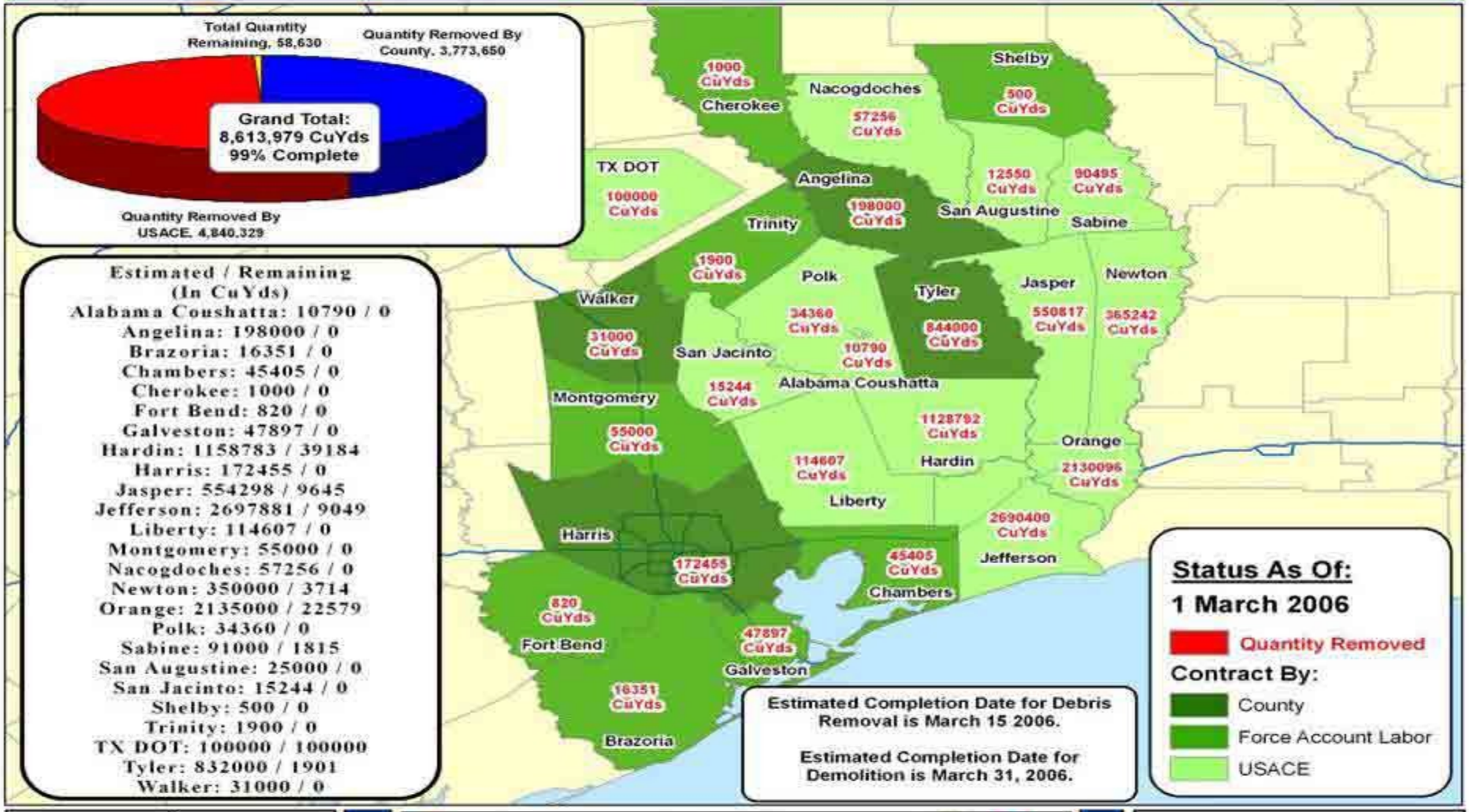
FEMA

Hurricane Rita: Debris Mission Status

Total Quantity Remaining, 58,630
Quantity Removed By County, 3,773,650
Grand Total: 8,613,979 CuYds 99% Complete
Quantity Removed By USACE, 4,840,329

Estimated / Remaining (In CuYds)

Alabama Coushatta: 10790 / 0
Angelina: 198000 / 0
Brazoria: 16351 / 0
Chambers: 45405 / 0
Cherokee: 1000 / 0
Fort Bend: 820 / 0
Galveston: 47897 / 0
Hardin: 1158783 / 39184
Harris: 172455 / 0
Jasper: 554298 / 9645
Jefferson: 2697881 / 9049
Liberty: 114607 / 0
Montgomery: 55000 / 0
Nacogdoches: 57256 / 0
Newton: 350000 / 3714
Orange: 2135000 / 22579
Polk: 34360 / 0
Sabine: 91000 / 1815
San Augustine: 25000 / 0
San Jacinto: 15244 / 0
Shelby: 500 / 0
Trinity: 1900 / 0
TX DOT: 100000 / 100000
Tyler: 832000 / 1901
Walker: 31000 / 0



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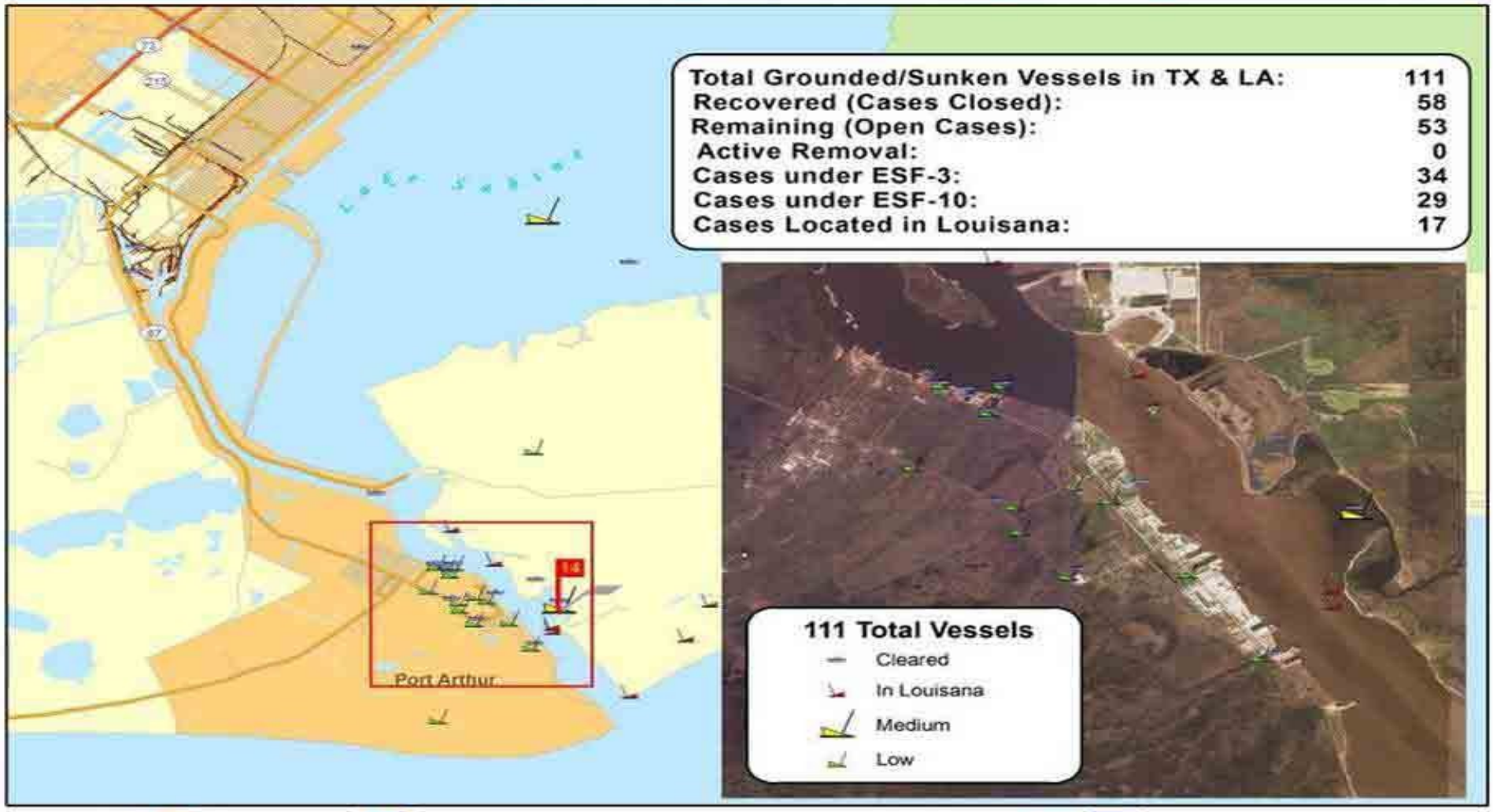
of Engineers

FEMA

Hurricane Rita - Sunken Vessel Removal

Total Grounded/Sunken Vessels in TX & LA:	111
Recovered (Cases Closed):	58
Remaining (Open Cases):	53
Active Removal:	0
Cases under ESF-3:	34
Cases under ESF-10:	29
Cases Located in Louisana:	17



U.S. Department of Homeland Security
United States Coast Guard

FEMA

2.5 1.25 0 2.5
Miles

US Army Corps of Engineers

Texas Temporary Housing

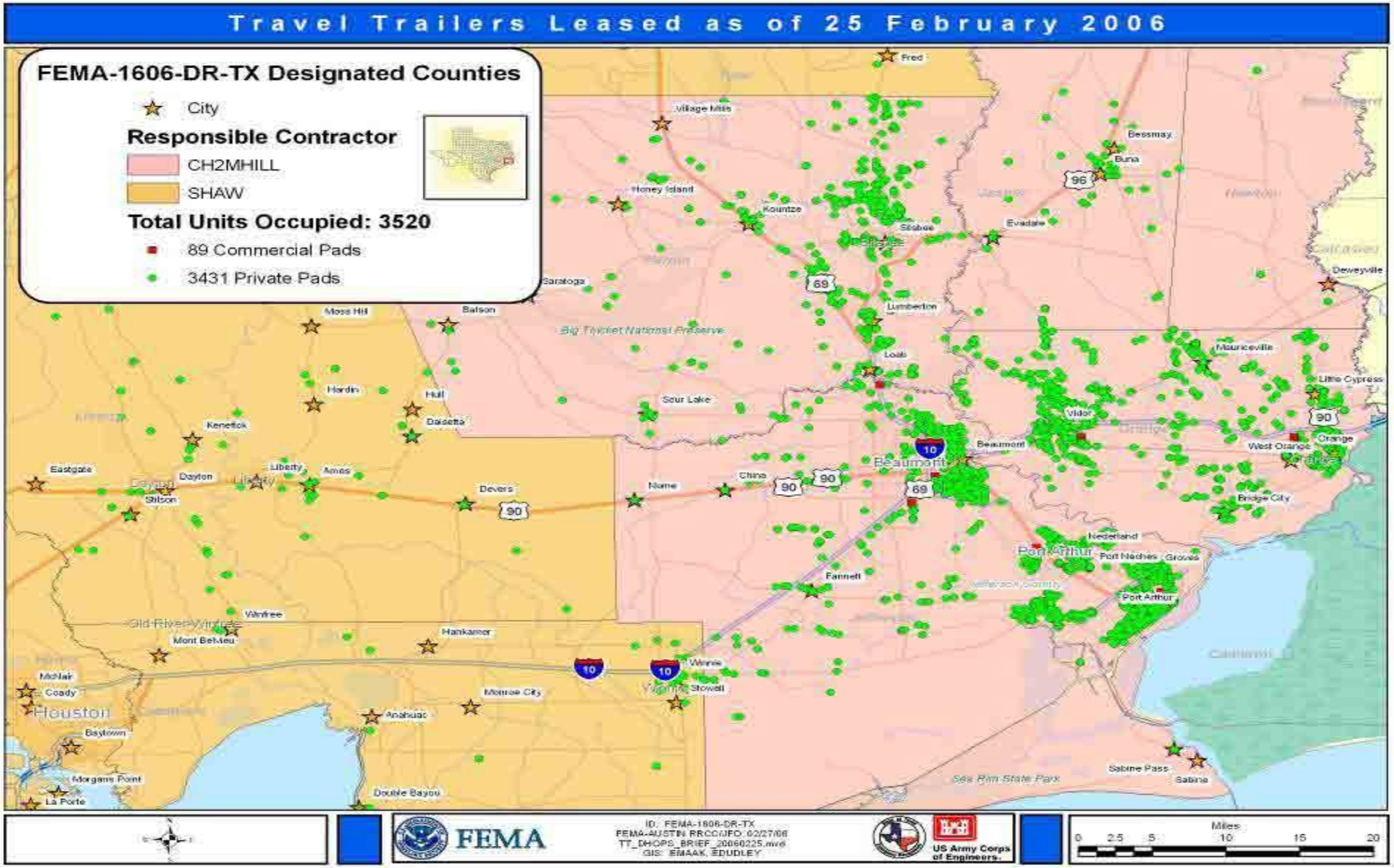
FEMA

- FEMA estimated need: 3,900 - 4,200 units
- 3,612 currently leased
- $150 million ($50K/set)
- Mission is ongoing

US Army Corps of Engineers

Temporary Housing

FEMA



US Army Corps of Engineers

FEMA

Lessons Learned

- Need for more USACE personnel in response (RRCC) to multiple missions (levies, water, ice, generators)
- USACE contract language definitions:
  - “installed” vs. “operating” generators created confusion
  - “installed” vs. “inspected” roofing created confusion

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FEMA

Best Practices

- During the Disaster:
  - Planning and Response Team (PRT) leaders from USACE were co-located with RRCC
  - RRCC was co-located with the JFO so operations transitioned smoothly from RRCC response to JFO response and recovery
  - USACE representative embedded in Planning (GIS)
    - Invaluable for response and recovery
    - Facilitated easier communication
    - Common operational picture regarding USACE operations